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4. TITLE AND SUBTITLE

Reactive Tile Fabrication Support

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5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

David Gerke

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Nu-Way Industries, Inc.

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

ATI, NWEC Consortium Management Firm
5300 International Blvd., Charleston, SC 29418

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12. DISTRIBUTION / AVAILABILITY STATEMENT

Public

13. SUPPLEMENTARY NOTES

14. ABSTRACT

Improved dimensional stability for laser welding with interlocking cutouts on the edges rather then internal return flanges.

Forming heavy gage 17-4 can be achieved by annealing to red hot 1900 F then air cool down to manageable 800 F rather than 800 F as suggest in the material data sheet. While plates were formed consideration for bulging, tolerance capabilities and slow throughput resulting in higher component costs. issue are inconsistent forms angles and variation of the material thickness through the bend and metal fatigue on over bends past 90 degrees.

15. SUBJECT TERMS

Laser welding, 17-4

16. SECURITY CLASSIFICATION OF: "U" unclassified			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			David Gerke
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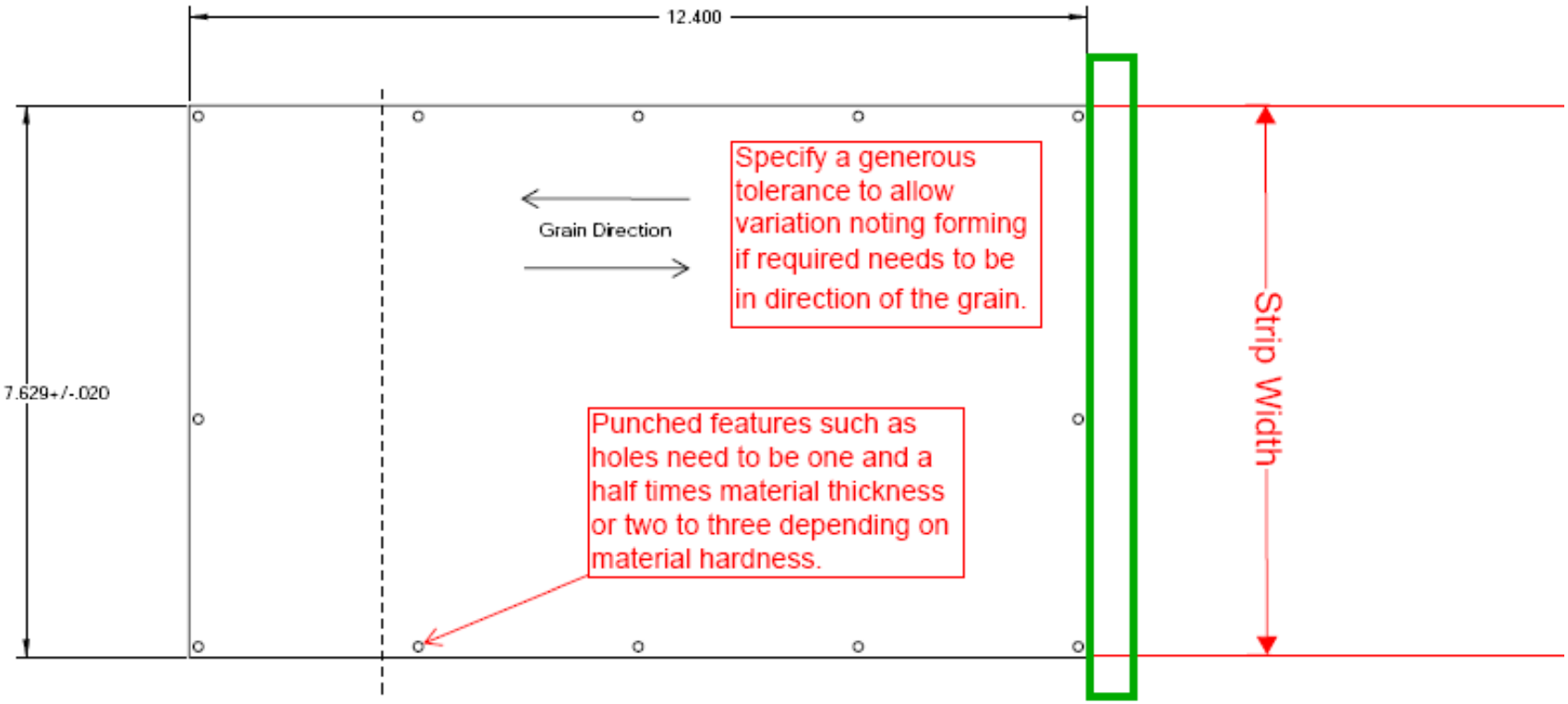
Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

Nu-Way Industries, Inc.

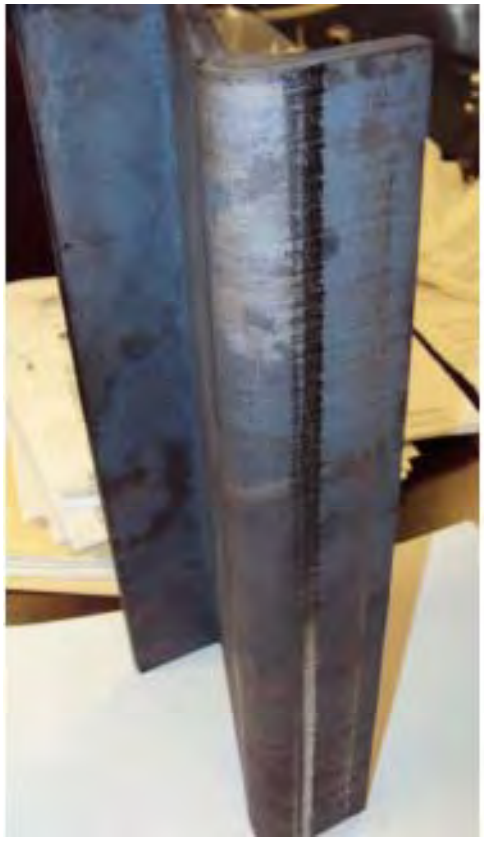
Final Report
Agreement 2011-303
10-01-INIT575

June 30th 2011

Parameters for stamping 17-4 with cutoff scrap only



Heavy Gage 17-4 Forming



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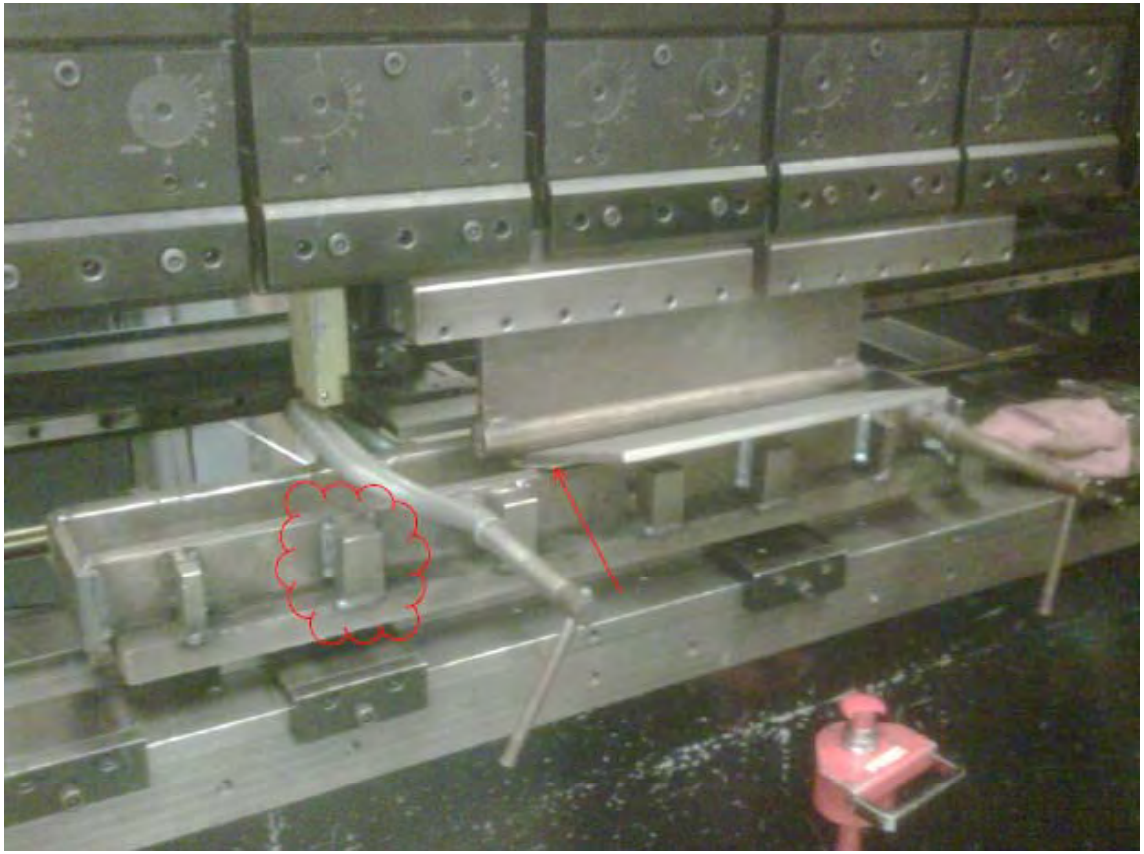
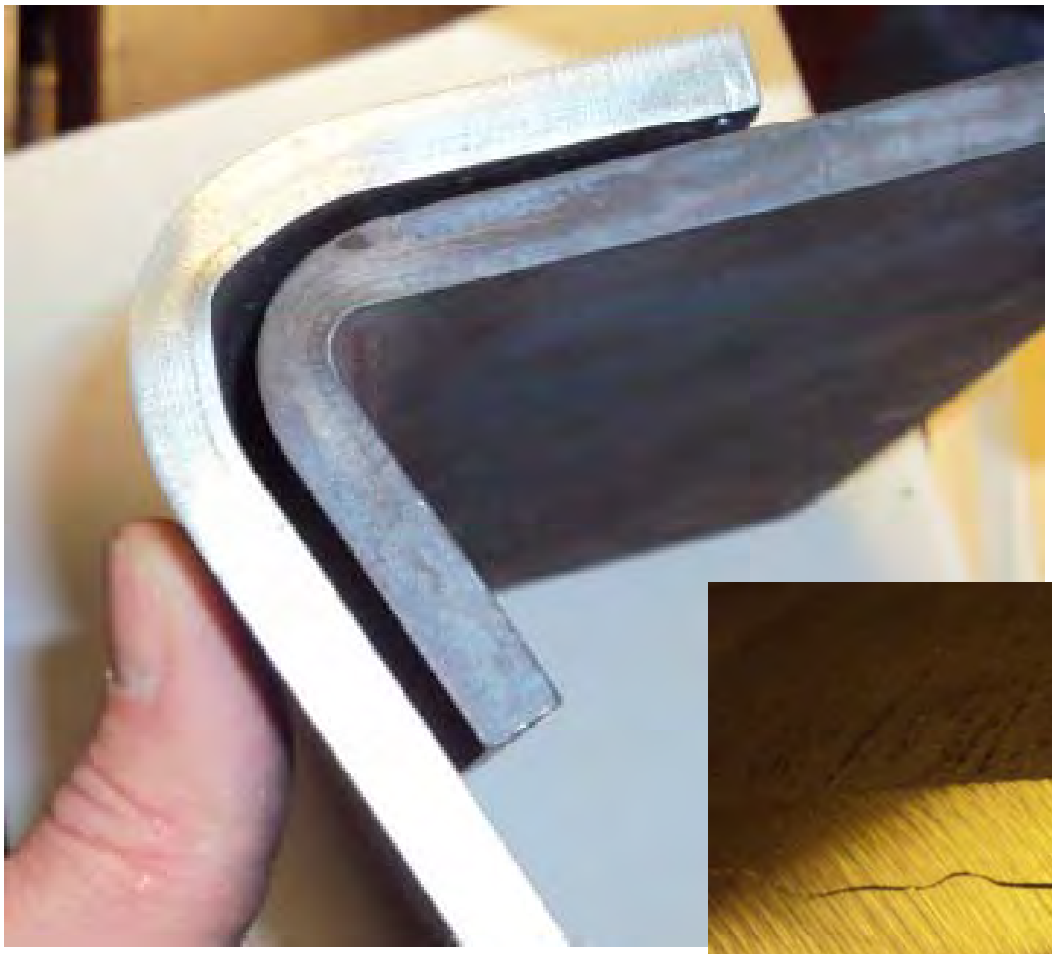
Heavy Gage 17-4 Forming

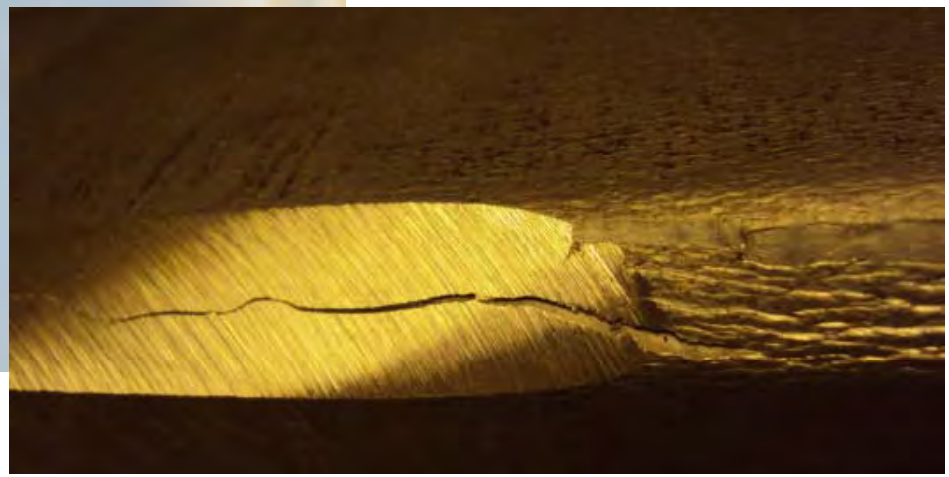


The forming fixture required weld gussets for support and plates had to be formed with a sub-plate to reduce stress and fracturing.

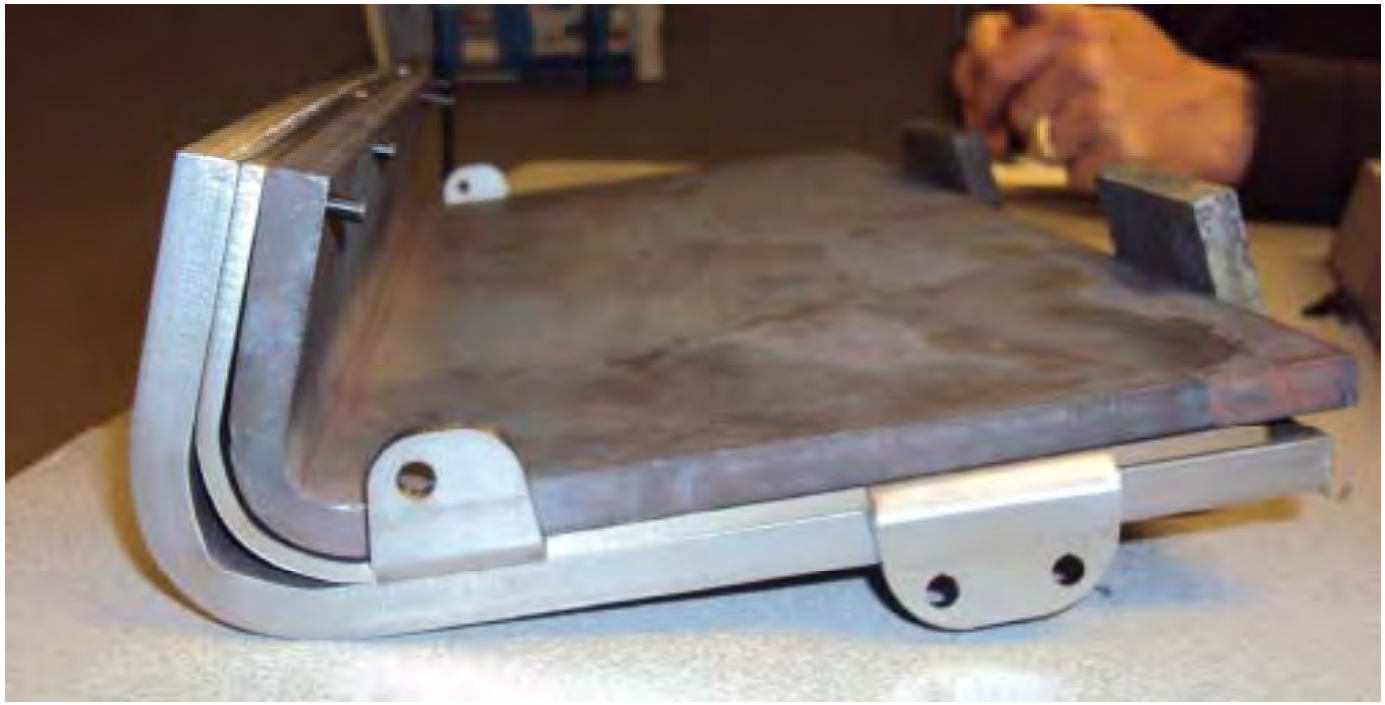
Heavy Gage 17-4 Forming



Some of the issue are inconsistent forms angles and variation of the material thickness through the bend and metal fatigue on over bends past 90 degrees.



Heavy Gage 17-4 Forming



Tolerances stack-up became a issue because of the inconsistent forms angles and variation of the material thickness through the bend.

Heavy Gage 17-4 Forming

The solution for the first six samples was to match each component of the tile by welding on strips to build back up the material to match the rails were the thickness variation resulted in gaps.

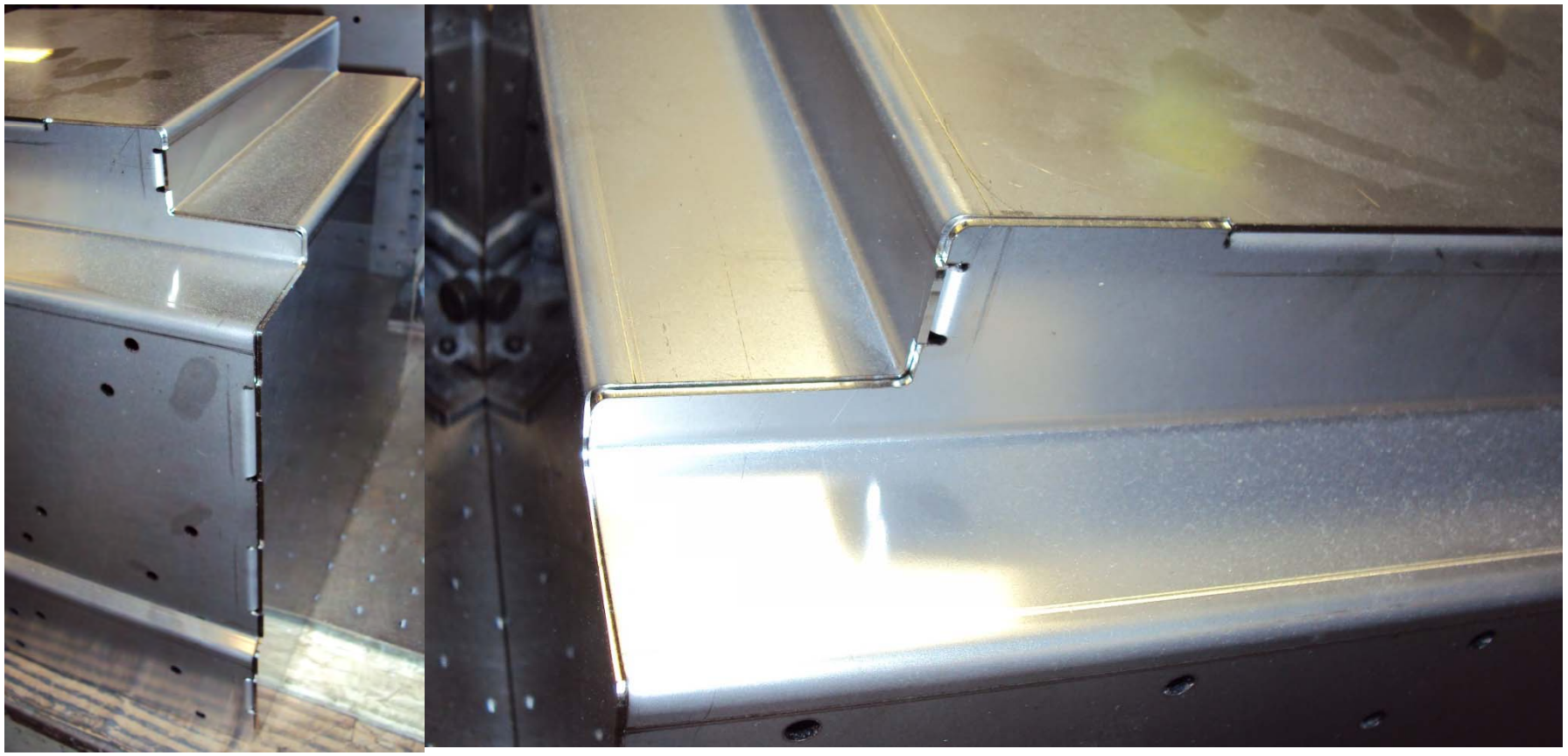
Transformation of Tile to Eliminate Forming

Flat 17-4 tile plates welded to .030” ¼ hard stainless steel

Transformation of Tile to Eliminate Forming

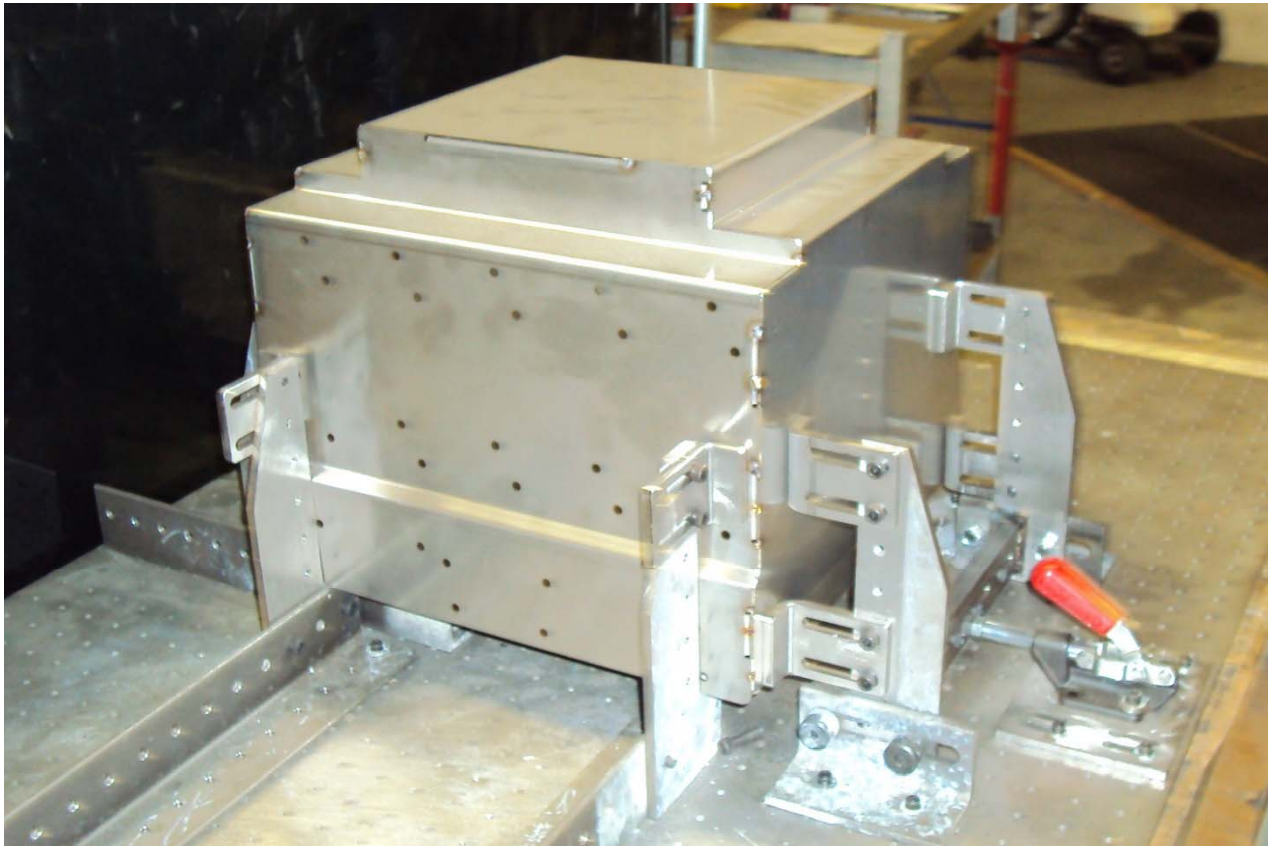
Flat 17-4 tile plates welded to .030” ¼ hard stainless steel with formed rails between for internal casing

Precision Component Forming



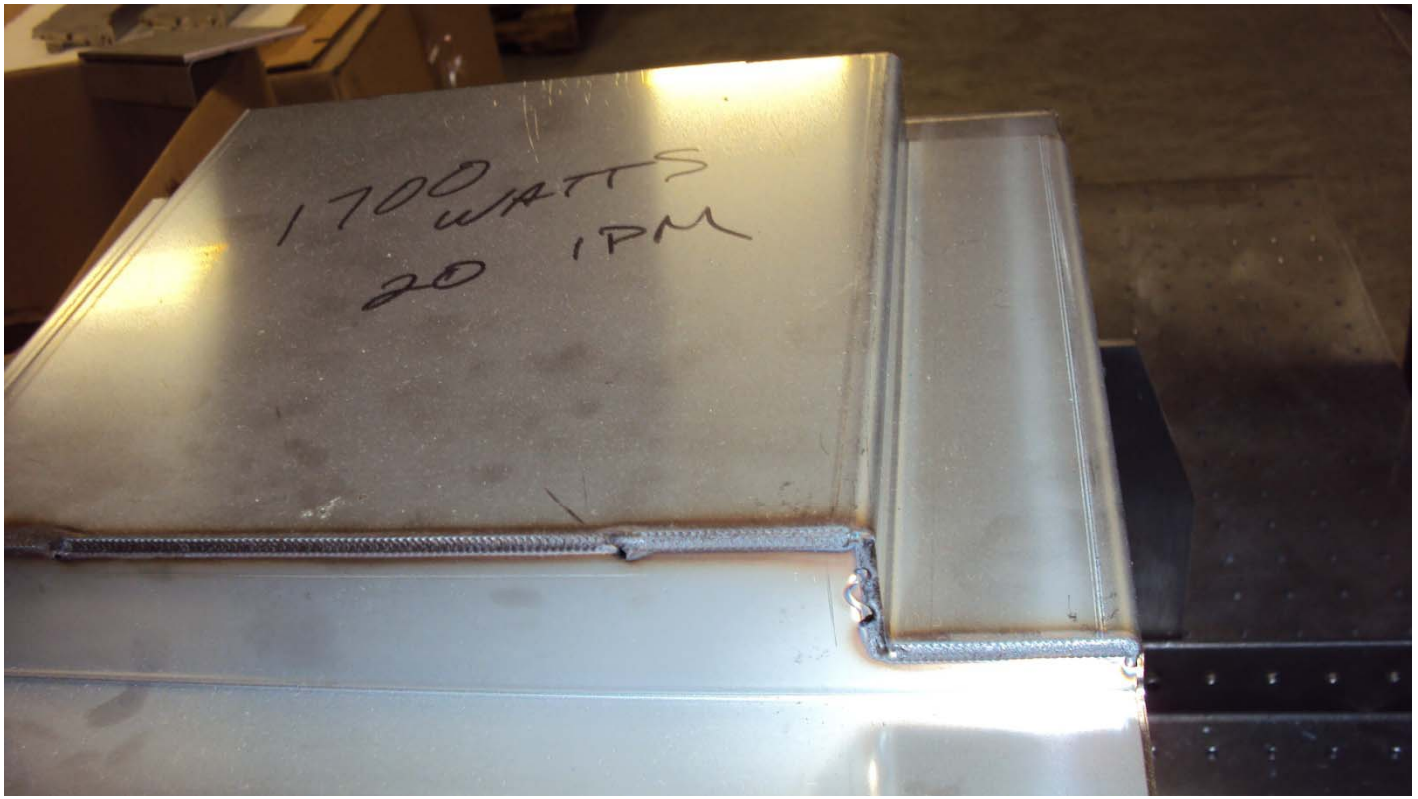
Mating of Housing components with interlocking features and fit up edges and corners

Precision laser weld fixture



Weld fixture for precision feature location

20 inches per minute laser weld



Laser weld result that could be improved with interlocking cutouts on the edges rather then internal return flanges.